

$\text{Bi}(\text{OH})_2\text{NO}_3$ separates out. . . . The nitric acid which is liberated passes into solution, so that a portion of the bismuth salt can remain dissolved. There is thus in the solution a chemical equilibrium with respect to the precipitate of basic salt, which is characterised by the concentration of the hydroxyl ion of the water being reduced, by the hydrogen ion of the free acid, to such a value as corresponds with the solubility-product of the basic salt. . . .

"When sodium thiosulphate is added to bismuth salts, a clear solution is obtained, which slowly decomposes with deposition of bismuth sulphide. The solution probably contains the sodium salt of a complex bismuth-thiosulphuric acid; for on addition of potassium salts, a very slightly soluble precipitate of $\text{K}_3\text{Bi}(\text{S}_2\text{O}_3)_3 + \text{H}_2\text{O}$ separates out, which may be looked upon as the potassium salt of this acid. Although it is probable that we are here dealing with a complex bismuth ion, accurate investigations are still wanting. It has been proposed to use the precipitate, which is of a yellow colour, as a means of detecting and precipitating potassium."

It seems almost a pity that the author, having before him the problem of presenting the material in such a new light, should not have seen fit to depart entirely from the traditional arrangement and set out the whole matter as he himself thought best. As he tells us in the preface, his choice was deliberate, and was no doubt well-considered, but the limitation in adhering to the historical treatment makes itself felt here and there throughout the book. It is new wine in old bottles.

No teacher of chemistry who takes the slightest interest in his profession or in his science can afford to leave this book unread. For the first time he has laid before him a presentation of the facts of elementary chemistry from the standpoint of modern theory, written as only Ostwald could have written it, and compelling attention, whether the reader agrees with the author or not. We understand that an English translation of the work has been undertaken, so that the student also will soon have it at his disposal. J. W.

AN AMERICAN ZOOLOGICAL TEXT-BOOK.
Text-Book of Vertebrate Zoology. By J. S. Kingsley.
Pp. viii + 439. Illustrated. (London: George Bell and Sons, 1900.) Price 12s. net.

AMONG the multitude of text-books upon various branches of zoology, or on zoology as a whole, that it has been our fortune to peruse, there are few, if any, of which we can say that they contain so much information in a comparatively small space as is the case with the one before us. Nor is this all; whereas many works of a kindred nature are written in such an extremely abstruse style, and are so overloaded with technicalities as to be well nigh unreadable by any but the most thorough-going and uncompromising biological student, the style of the present volume is so easy, and the technical terms are so carefully explained, that a reader with little or no previous knowledge of anatomy or zoology would readily comprehend the nature of the structures described.

We refer in this connection to structures rather than to animals, because vertebrate morphology, based upon embryology, forms a leading feature of the book, the whole of the first part of which, comprising considerably more than half of the text, is devoted to this section of

the subject. A systematic survey of all the leading groups of vertebrates constitutes the second moiety. And since there are few works known to us in which these two great divisions of the subject receive such an equal share of attention, on this ground alone Prof. Kingsley's treatise has a decided advantage over many of its fellows. Neither are his descriptions confined to the vertebrates of the present day, their extinct predecessors receiving a considerable share of attention. The work is, therefore, thoroughly comprehensive in its scope; and is, in fact, for the most part exactly what such a treatise should be. Although it by no means does away with the need for text-books dealing with the palæontological aspect of the subject, it serves to indicate that the day when the zoologist and palæontologist worked on separate lines is gone for ever.

In a very large number of instances those whose studies are chiefly devoted to the anatomical and embryological side of zoology fail to keep themselves abreast of modern views in regard to systematic classification. But this cannot be laid to the charge of the author of the present volume, who has adopted a thoroughly modern and up-to-date system of classification, as is especially noticeable in his treatment of the fishes and of that group of vertebrates typified by the lampreys and hag-fishes, for which a popular collective title is at present a desideratum. The division of mammals into Prototheria and Eutheria alone is also a feature in accord with modern ideas.

Indeed, not only is Prof. Kingsley thoroughly up-to-date as regards classification, but in one instance, at least, he is ahead of contemporary opinion. We refer to his treatment of that difficult subject, the classification of birds. In his preface the author states that

"he has been unable to recognise in the so-called orders of ornithologists groups of birds of more than family rank, while their families are equivalent to genera in the other classes of vertebrates."

Accordingly, we find the class Aves divided into four ordinal groups only, namely, the (1) Saururæ, as represented by Archæopteryx; (2) Odontormæ, typified by Ichthyornis; (3) Odontholcæ, containing Hesperornis; and (4) Eurhipiduræ, including all living birds. While our sympathies are to a very great extent on the side of the author in this matter, we are by no means prepared to go the whole way with him in this sweeping change, and venture to think that in this, as in most other matters, a *via media* is to be found. Moreover, we feel sure that if all existing birds are to be included in a single ordinal group, there is not the slightest justification for separating the cretaceous toothed birds (Hesperornis and Ichthyornis) as separate groups from the mere fact that they retain teeth, and in one instance biconcave vertebræ.

But all this is, to a great extent, a matter of detail, from which we return to the consideration of the work as a whole.

On one point, and on one point only, we take leave to consider that the author is unsound, and this is in connection with nomenclature. As he tells us in his preface, he refuses to change well-known generic names on the ground of priority, because "these are the names of morphological literature." If systematic zoologists have,

practically unanimously, come to the conclusion that Molge, and not Triton, is, for example, the proper title of the newts, and morphologists refuse to accept the change, we can only say so much the worse for the morphologists.

As we have already said, great credit is due to Prof. Kingsley for the attention he has devoted to the systematic part of his subject, as his own special studies are mainly directed to the anatomical and embryological aspects. But in these days it is well nigh impossible for a man to gain sufficient knowledge of a section of a subject with which he is not thoroughly familiar as to avoid mistakes when writing on it. And it would have been better for the reader had the author invoked the aid of a few specialists to revise the proofs of the systematic section of the work. Many awkward "misprints" and other errors would thereby have been avoided.

Restricting our criticism in this respect to the chapter on mammals, we may call attention to quite a number of "misprints" between pp. 395 and 399, most of which will be self-apparent to those conversant with the subject. One of the most serious is *Choeropus* for *Choeropsis* (p. 398); the one name indicating a marsupial and the other a hippopotamus!

But there are more serious errors still. On p. 399 we are told, for instance, that among the fossil genera of antelopes are *Cosoryx*, *Tragelaphus* and *Antidorcas*; the second being the title of the existing bushbucks, or harnessed antelopes, and the third that of the springbuck, which is alluded to on the same page as *Gazella euchore*, *Cosoryx* being also mentioned higher up on the same page as a deer! Neither is it correct to say that the American deer form only a sub-genus of *Cervus*. Again (p. 400), the domesticated Indian cattle are not the typical representatives of *Bibos*, and, indeed, do not belong to that group at all; while the statement (p. 401) that mastodons occur in Africa is, so far as we are aware, not founded upon fact. Were we disposed to dwell upon them, many other errors of a kindred nature might be pointed out, but we pass on to the illustrations.

Such of the latter as relate to anatomical structures and the development of the embryo are far the most satisfactory, and serve their purpose well, although frequently not of a very high class from an artistic point of view. But when we turn to the figures of birds and mammals we are surprised that any publisher could have been found willing to print such ghastly productions. Perhaps the very worst amongst a hopelessly bad lot are those of a bird of paradise on p. 350, and of the Sumatran rhinoceros on p. 355. Smudgy daubs is a mild way of describing them; and in the present age of cheap photographic illustration, the appearance of such ill-executed caricatures in any book is nothing short of a disgrace to all concerned in its production.

As regards the palaeontological aspects of the subject, we think the author is to be congratulated on the manner in which it is treated. Of course there will be errors—and the omission of any mention of *Ophthalmosaurus* when noticing the *Ichthyosauria* (p. 313) is one—but they are few and far between; and in the main the relations of the extinct to the living types are well explained.

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Apparently the book has been previously published in America, and its reproduction in this country may be taken as an indication that it has met with a favourable reception in the land of its birth. In spite of the blemishes to which we have referred (and they are, after all, not very great), we have no hesitation in saying that Prof. Kingsley's little volume is worthy of a hearty welcome on this side of the Atlantic on the part of both teachers and pupils.

R. L.

POPULAR BIBLICAL STUDIES.

The Social Life of the Hebrews. By the Rev. Edward Day. The Semitic Series. Pp. 255. (London: John C. Nimmo, 1901.)

THE present volume is the second of a series published under the editorship of Prof. Craig, of the University of Michigan, with the object of presenting "in popularly scientific form" the results of recent researches in Semitic fields. Prof. Craig has laid down for the last two years an ambitious programme of the work to be done in his series, and has announced the titles of no less than thirteen books of the series, but up to the present time only two of them have appeared. The first, by Prof. Sayce, was devoted to the social life of the Babylonians and Assyrians, and was reviewed by us last year; the second, which has appeared this year, and with which we are concerned, deals with the manners and customs of the ancient Hebrews. Mr. Day has undertaken a subject of great interest and, at the same time, one of great difficulty, inasmuch as almost the only sources accessible are limited to the Books of the Old Testament.

The publication of the late Prof. Robertson Smith's "Kinship and Marriage" and "Religion of the Semites" marked a great advance in Semitic learning, and since that time all writers on the customs of the Hebrews have been in great measure indebted to these books. In the first part of his book Mr. Day summarises to a certain extent the main features of Prof. Robertson Smith's work, though with some serious omissions. The Clan, the Family and Sacrifice are dealt with in three short chapters, none too much space for such important subjects, though doubtless enough for a popular work, while the remainder of the first part treats of the Hebrews during the period of the Judges. But no explanation at all has been given of the significance of circumcision, either as a sacrificial rite or from its connection with the *hōthēn* "wife's father"; and though this may be due to the fact that the book is a popular work, yet, on the same grounds, a good deal of the matter relating to the licentious temple worship and similar customs might have been omitted. More, too, might have been said with advantage on the subject of totemism, which is but briefly discussed. The difficult subject of the Hebrew idea of the immortality of the soul has, perhaps, been reserved for another volume of the series, but we should have been glad to see a little more space devoted to the popular beliefs concerning Sheol, which is only spoken of once. Some reference, also, might have been made to the stress laid by the Hebrews on the importance of posterity and of prolonging the family name, which thereby acquired a terrestrial immortality. The chapter on the conception of Yahweh towards the